

Claim Amendments

13. (amended) A control device for a work appliance comprising:

a scoop held on an extension arm, in particular for a wheeled loader;
two hydraulic cylinders, of which the first actuates the extension arm
and the second actuates the scoop;
a pump supplying the two cylinders with pressure medium from a
tank; and

wherein the control device comprises:
two valves, of which the first valve controls the supply of pressure medium
from the pump to the first cylinder and the second valve controls the supply
of pressure medium from the pump to the second cylinder;

wherein the control device is operative to activate each of the valves
(42, 41) by holding the ratio (Q_2/Q_1) of the pressure medium quantities (Q_2 ,
 Q_1) supplied to the two cylinders (22, 18) at a constant value (KQ)
independently of the size of a control signal (Y_{st1}) supplied to the first
valve (41)

and wherein the motional relationship between the first and second
hydraulic cylinders controlled by the two valves is maintained even in the
event of undersaturation of pump delivery.

14. (amended) The control device as claimed in claim 13, wherein each of
said valves (41, 42) is provided with a slide (47, 50) acted upon by an
adjustable control pressure (P_{st1A} or P_{st1B} , P_{st2A} or P_{st2B}) ;

the control pressure (~~Pst1A or Pst1B~~, Pst2A or Pst2B) deflects the slide (47, 50) counter to the force of a spring (48 or 49, 51 or 52), the positions of the respective slides (47, 50) being a measure of the force resulting from the control pressures (~~Pst1A or Pst1B~~, Pst2A or Pst2B) acting on the slide (47, 50) and from the surfaces of the respective cylinders acted upon by pressure;

each of said slides (47, 50) is provided with a notch which runs in its longitudinal direction and determines the size of the passage cross section (~~AA1 or AB1~~, AA2 or AB2) of the respective valve (41, 42) and which provides a respective passage cross section (~~AA1 or AB1~~, AA2 or AB2) for the respective valve (41, 42) determined by the position of the slide (47, 50); and each of said valves (41, 42) is assigned a pressure compensator (79, 85) which keeps the pressure drop (~~bP1~~, bP2) of the valves (41, 42) at the same value.

15. (amended) The control device as claimed in claim 14, wherein the passage cross section (~~AA1 or AB1~~, AA2 or AB2) of each of the two valves (41, 42) changes linearly with the control pressure (~~Pst1A or Pst1B~~, Pst2A or Pst2B) supplied to them.

16. (amended) The control device as claimed in claim 14, wherein a surface of the slide (47) of the first valve (41) which is acted upon by the control pressure (~~Pst1A or Pst1B~~) is equal to a surface of the slide (50) of the second valve (42) which is acted upon by the control pressure (~~Pst2A or~~

Pst2B).

17. (amended) The control device as claimed in claim 14, wherein the inlet of the second valve (42) for the control pressure (Pst2A or Pst2B) is preceded by a valve arrangement (65, 66; 68, 69), via which said valve can be supplied with the control pressure (Pst1A, Pst1B) for the rotational movement of the extension arm (12) or with the control pressure (Pst3A, Pst3B) for the rotational movement of the scoop (14) .

18. (amended) The control device as claimed in claim 17, wherein the valve arrangement is constructed as a shuttle valve (65, 68), one inlet of which is supplied with the control pressure (Pst1A, Pst1B) for the rotational movement of the extension arm (12) and the other inlet of which is supplied with the control pressure (Pst3A, Pst3B) for the rotational movement of the scoop (14).

19. (amended) The control device as claimed in claim 18, wherein, in the control pressure line (56, 57) leading to the first inlet of the shuttle valve (65, 68), a switching valve (66, 69) is arranged, which, in one position, interrupts the supply of the control pressure (Pst1A, Pst1B) for the rotational movement of the extension arm (12) to the inlet for the control pressure (Pst2A, Pst2B) of the second valve (42), and at the same time supplies the first inlet of the shuttle valve (65, 68) with a pressure (tank pressure) which

is lower than the respective control pressure (P_{st3A} , P_{st3B}) for the rotational movement of the scoop (14) or is equal to said control pressure.

20. (amended) The control device as claimed in 17, wherein the valve arrangement (69*, 68) interrupts the supply of the control pressure (P_{st1B}) for the rotational movement of the extension arm (12) in the lowering direction to the inlet for the control pressure (P_{st2B}) of the second valve (42) when this pressure (P_{st1B}) overshoots an adjustable value (P_{sts}).

21. (amended) The control device as claimed in claim 20, wherein the switching valve (66*) interrupts the supply of the control pressure (P_{st1A}) for the rotational movement of the extension arm (12) in the raising direction to the first inlet of the assigned shuttle valve (65) when the pressure (P_{st1B}) for the rotational movement of the extension arm (12) in the lowering direction overshoots an adjustable value (P_{sts}).

22. (amended) The control device as claimed in claim 14, wherein the notch (95) of the slide (50) of the second valve (42) is formed in such a way that, when the slide (50) of the second valve (42) is acted upon by a control pressure (P_{st2A} , P_{st2B}) which is higher than the control pressure ($P_{st1A}(65\%)$, $P_{st1B}(65\%)$), required for the maximum pressure medium quantity (Q_{1max}), for the first valve (41), the passage cross section (A_{A2} , A_{A2}) of the second valve (42) increases with a rise in control pressure

~~{Pst2A, Pst2B}~~ to a greater extent than in the range below the control pressure ~~{Pst1A(65%) Pst1B(65%)}~~, required for the maximum pressure medium quantity ~~{Q1}~~, for the first valve ~~{41}~~.

23. (amended) The control device as claimed in claim 14, wherein the spring constant of the spring ~~(48 or 49)~~ acting on the first slide ~~{47}~~ is equal to the spring constant of the spring ~~(50, 51)~~ acting on the second slide ~~{50}~~.

24. (amended) The control device as claimed in claim 14, wherein a counterholding valve ~~(91, 87)~~ controlled by the inflow pressure is arranged in a line ~~{35, 39}~~ leading from a cylinder ~~(18, 22)~~ acted upon by a pulling load to the tank ~~{29}~~ .

25. (new) A control device for a work appliance in which a shovel is held on an extension arm, in particular for a wheeled loader, comprising:

two hydraulic cylinders, of which the first actuates the extension arm and the second actuates the shovel;

a pump supplying the cylinders with pressure medium from a tank;

two valves, of which the first valve controls the supply of pressure medium from the pump to the first cylinder and the second valve controls the supply of pressure medium from the pump to the second cylinder, each valve being provided with a spool having a surface acted upon by an adjustable control pressure counter to the force of a spring and being provided with a notch which runs in its longitudinal direction and determines

the size of the passage cross section of the valve and which is formed in such a way that the respective passage cross section of the valve is determined by the position of the spool;

two pressure compensators of which one is arranged downstream of the passage cross section of the one valve and the other downstream of the passage cross section of the other valve and which are acted upon in the closing direction by the highest load pressure and in the opening direction by the pressure downstream of the assigned passage cross section, whereby the valves can be activated in such a way that the ratio of the pressure medium quantities supplied to the two cylinders is held at a constant value independently of the size of the control pressure supplied to the first valve;

whereby a desired motional relationship between those parts of the equipment that are moved by the two hydraulic cylinders is maintained even in the event of an undersaturation condition.

26. (new) A control device according to claim 25, wherein the passage cross section of the two valves changes linearly with the control pressure supplied to them.

27. (new) A control device according to claim 25, wherein the surface of the spool of the first valve which is acted upon by the control pressure is equal to that surface of the spool of the second valve which is acted upon by the control pressure.

28. (new) A control device according to claim 26, wherein the surface of the spool of the first valve which is acted upon by the control

pressure is equal to that surface of the spool of the second valve which is acted upon by the control pressure.

29. (new) A control device according to claim 25, wherein the inlet of the second valve for the control pressure is preceded by a valve arrangement, via which said valve can be supplied with the control pressure for the rotational movement of the extension arm or with the control pressure for the rotational movement of the shovel.

30. (new) A control device according to claim 29, wherein the valve arrangement is constructed as a shuttle valve, one inlet of which can be supplied with the control pressure for the rotational movement of the extension arm and the other inlet of which is supplied with the control pressure for the rotational movement of the shovel.

31. (new) A control device according to claim 30, wherein the control pressure line leading to the first inlet of the shuttle valve, a switching valve is arranged, which, in one position, interrupts the supply of the control pressure for the rotational movement of the extension arm to the inlet for the control pressure of the second valve and at the same time supplies the first inlet of the shuttle valve with a pressure (tank pressure) which is lower than the respective control pressure for the rotational movement of the shovel or is equal to said control pressure.

32. (new) A control device according to claim 29, wherein the valve arrangement interrupts the supply of the control pressure for the rotational

movement of the extension arm in the lowering direction to the inlet for the control pressure of the second valve when this pressure (p_{st1B}) overshoots an adjustable value.

33. (new) A control device according to claim 32, wherein the switching valve interrupts the supply of the control pressure for the rotational movement of the extension arm in the raising direction to the first inlet of the assigned shuttle valve when the pressure for the rotational movement of the extension arm in the lowering direction overshoots an adjustable value.

34. (new) A control device according to claim 25, wherein the notch of the spool of the second valve is formed in such a way that, when the spool of the second valve is acted upon by a control pressure which is higher than the control pressure required for the maximum pressure medium quantity for the first valve, the passage cross section of the second valve increases with a rise in control pressure to a greater extent than in the range below the control pressure required for the maximum pressure medium quantity for the first valve.

35. (new) A control device according to claim 25, wherein the spring constant of the spring acting on the first spool is equal to the spring constant of the spring acting on the second spool.

36. (new) A control device according to claim 25, wherein a counterholding valve controlled by the inflow pressure is arranged in a line leading from a cylinder acted upon by a pulling load to the tank.